

DIVISION OF FOREST PEST CONTROL



Northeastern Area State & Private Forestry

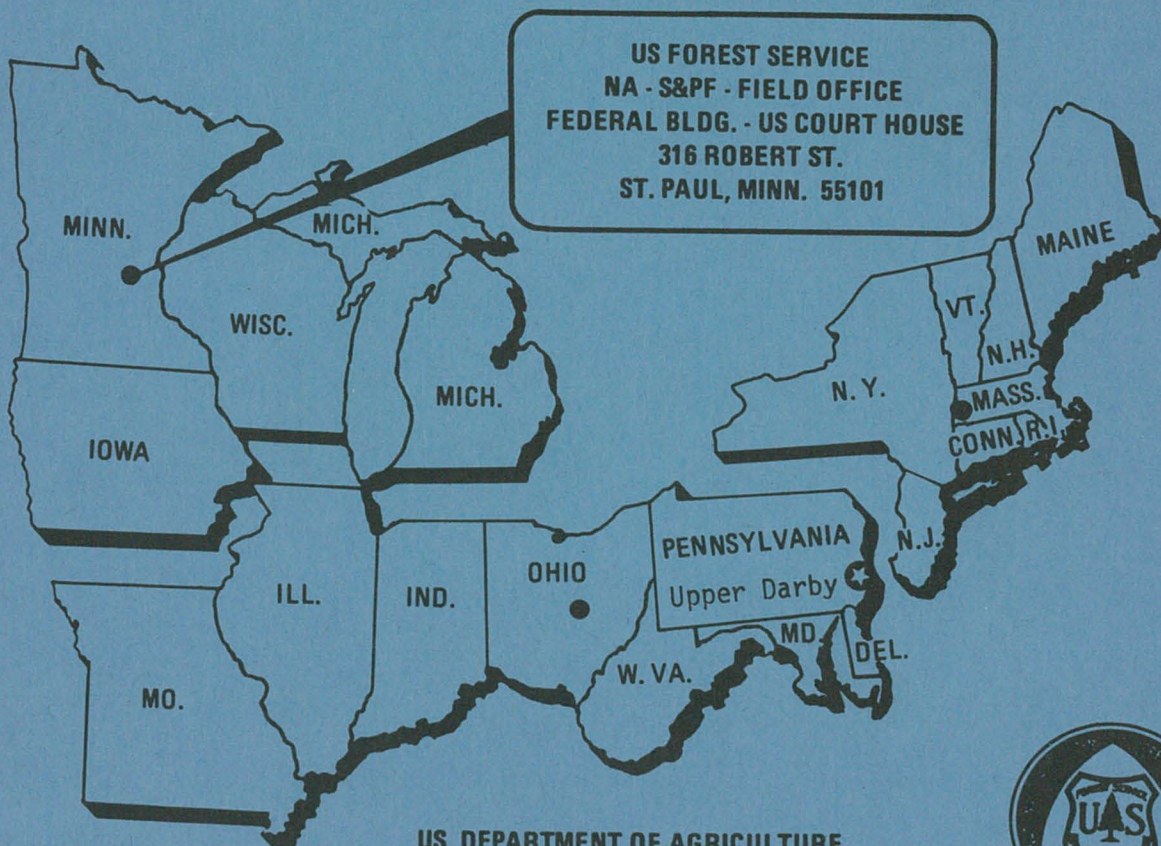
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RESULTS OF RED-HEADED PINE SAWFLY DEFOLIATION
SURVEY ON THE HIAWATHA NATIONAL FOREST, MICHIGAN

By Imants Millers



US DEPARTMENT OF AGRICULTURE
FOREST SERVICE



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ABSTRACT

Systematic surveys of red pine plantations on the East Unit of the Hiawatha National Forest, Michigan, showed heavy infestations of red-headed pine sawfly in 3 plantations covering 90 acres. The St. Paul Field Office, Forest Pest Control Staff recommends the plantations be left untreated until sawfly damage impact can be determined.

SURVEY METHODS

All Forest Service plantations, with red pines between 2 ft. and 10 ft. in height, were examined for sawfly damage. First, a rapid survey was made through a plantation to detect and estimate sawfly damage. When less than 5% of trees were found with sawfly feeding the plantation was considered safe from serious damage. An intensive systematic survey was made when 5% or more trees had sawfly damage.

For the intensive survey, a minimum of 25 sample plots were examined in a plantation. The number of plots was increased in areas over 40 acres in size as follows: 1 additional plot for each 2 acres over 40, and 1 additional plot for each 5 acres over 80. The plots were systematically distributed in a plantation to give broad coverage of the area.

Each sample plot consisted of 4 consecutive red pines in a row. Dead trees were counted only if the cause of death appeared to be from previous sawfly defoliation. The degree of defoliation for each tree was estimated to the nearest 10%; previous and current defoliation was recorded separately.

RESULTS

Sawfly defoliation was found in 3 red pine plantations, covering a total area of 90 acres (Table I). The average number of trees with sawfly defoliation increased from 3.7% to 22.3%. About 1/3 of the trees infested in 1969 were re-infested in 1970, i.e. 1.3% of all trees were infested in 2 successive years. The severity of defoliation of infested trees increased from 19.3% to 30.7% on the average.

DISCUSSION

The effects of red-headed pine sawfly caused defoliation, on red pine in particular, are poorly documented. Most forest entomologists in the Lake States have seen dead red pine, apparently the result of complete defoliation by the sawfly. Benjamin (1955) shows a photograph of a sawfly killed red pine, but in the text he provides mortality data only for jack pine and southern pines. However, his introductory statement in the chapter discussing the influence of defoliation on host states:

"In northern United States and Canada, jack and red pines succumb to a single, complete defoliation."

Artificial defoliation of red pine, as well as defoliation by other insects, causes tree mortality (Kulman, 1971). Although no serious doubt exists that the red-headed pine saw-

fly can kill red pine, documented confirmation in the field is needed.

Similar conclusions can be reached for the effects of defoliation of a branch on a tree. Benjamin (1955) indicates that single branches completely defoliated generally die, although partially defoliated branches frequently survive if a few needles, or living needle stubs, remain near the bud.

Studies near Cadillac, Michigan, provide information on the relationships between numbers of sawflies and the resultant degree of defoliation, as well as the expected number of colonies per tree within a given level of plantation infestation (Benjamin, 1955). Briefly, he shows that small trees 1-2 feet in height can be defoliated by a single sawfly colony, while larger trees require more colonies. In addition, he found that the number of colonies per tree increases with an increase in the percentage of trees infested. Flink (personal communications) has tentative data showing that an average sawfly larva defoliates about 1 linear inch of red pine branch. Thus, a colony of about 70 sawfly larvae could completely defoliate about 6 linear feet of red pine branch--the approximate amount of foliated branch found on a 3 ft. tree.

Effects of 2 successive years of partial red pine defoliation by the sawfly are not reported. However, reduction of the total complement of foliage and reduction in the length of the needles can be assumed. This would result in net loss of food available to the sawfly colony. Therefore, fewer sawflies would be needed to defoliate a previously attacked tree. The data in Table I indicate that about 1/3 of the trees are re-infested at St. Ignace.

A study is planned to determine the significance of consecutive sawfly defoliation on a tree. This information would improve sawfly damage evaluations.

In cost-benefit analysis, the resource manager needs to know how much he can expect to lose from a given sawfly infestation. Literature is meager in providing this information. Benjamin (1955) reports that 2 sawfly colonies completely defoliated a 2 ft. red pine. In jack pine plantations about 6 ft. tall, he found 1 colony per tree when about 10% of the trees had colonies, and up to an average of 2 colonies per tree when about 60% of the trees were infested. He also indicated that tree mortality begins when about 10% of the trees

RECOMMENDATIONS

Chemical control of the sawfly is not recommended at this time, because the severity of damage cannot be predicted. The FPC Staff at St. Paul will use the areas to determine how much resource damage is caused by a given level of sawfly infestation.

Field personnel should report any new sawfly infestations (use Form NA-5200-1) to the St. Paul Field Office.